WHAT IS CLAIMED IS:

1. A fuel cell comprising:

an electrolyte membrane; and

a first electrode and a second electrode provided on said electrolyte membrane;

wherein at least one of said first electrode and said second electrode is provided with a gas diffusion layer including a modified cross-sectioned carbon fiber.

2. The fuel cell as set forth in Claim 1, wherein said modified cross-sectioned carbon fiber has a recess in a cross-sectional shape thereof.

3. The fuel cell as set forth in Claim 2, wherein said recess provides said gas diffusion layer with water retention capability.

4. The fuel cell as set forth in Claim 1, wherein a degree of irregularity of said modified cross-sectioned carbon fiber is not less than 1.3.

5. The fuel cell as set forth in Claim 2, wherein a degree of irregularity of said modified cross-sectioned carbon fiber is not less than 1.3.

6. The fuel cell as set forth in Claim 3, wherein a degree of irregularity of said modified cross-sectioned carbon fiber is not less than 1.3.

7. The fuel cell as set forth in Claim 1, wherein a ratio of a longest distance R against a shortest distance r (R/r) from the center of gravity of a cross-section of said modified cross-sectioned carbon fiber to an outer circumference thereof is not less than 1.2.

8. The fuel cell as set forth in Claim 2, wherein a ratio of a longest distance R against a shortest distance r (R/r) from the center of gravity of a cross-section of said modified cross-sectioned carbon fiber to an outer circumference thereof is not less than 1.2.

9. The fuel cell as set forth in Claim 3, wherein a ratio of a longest distance R against a shortest distance r (R/r) from the center of gravity of a cross-section of said modified cross-sectioned carbon fiber to an outer circumference thereof is not less than 1.2.

10. The fuel cell as set forth in Claim 1, wherein a cross-section of said modified cross-sectioned carbon fiber is one of a cross-shape, an X-shape, a Y-shape, a W-shape, an H-shape, an L-Shape, a star-shape and a multifoil-shape.

11. The fuel cell as set forth in Claim 1, wherein said gas diffusion layer is constituted essentially of a mixture of said modified cross-sectioned carbon fiber and a circular cross-sectioned carbon fiber.

12. The fuel cell as set forth in Claim 2, wherein said gas diffusion layer is constituted essentially of a mixture of said modified cross-sectioned carbon fiber and a circular cross-sectioned carbon fiber.

13. The fuel cell as set forth in Claim 3, wherein said gas diffusion layer is constituted essentially of a mixture of said modified cross-sectioned carbon fiber and a circular cross-sectioned carbon fiber.

14. The fuel cell as set forth in Claim 1, wherein said gas diffusion layer is formed in a woven cloth structure constituted essentially of a weaving yarn solely including said modified cross-sectioned carbon fiber or including said modified cross-sectioned carbon fiber and a circular cross-sectioned carbon fiber in a predetermined proportion.

15. The fuel cell as set forth in Claim 2, wherein said gas diffusion layer is formed in a woven cloth structure constituted essentially of a weaving yarn solely including said modified cross-sectioned carbon fiber or including said modified cross-sectioned carbon fiber and a circular cross-sectioned carbon fiber in a predetermined proportion.

16. The fuel cell as set forth in Claim 3, wherein said gas diffusion layer is formed in a woven cloth structure constituted essentially of a weaving yarn solely including said modified cross-sectioned carbon fiber or including said modified cross-sectioned carbon fiber and a circular cross-sectioned

carbon fiber in a predetermined proportion.

17. The fuel cell as set forth in Claim 1, wherein said gas diffusion layer is formed in a nonwoven cloth or paper structure constituted substantially of said modified cross-sectioned carbon fiber alone or of a mixture in a predetermined proportion of said modified cross-sectioned carbon fiber and a circular cross-sectioned carbon fiber.

18. The fuel cell as set forth in Claim 2, wherein said gas diffusion layer is formed in a nonwoven cloth or paper structure constituted substantially of said modified cross-sectioned carbon fiber alone or of a mixture in a predetermined proportion of said modified cross-sectioned carbon fiber and a circular cross-sectioned carbon fiber.

19. The fuel cell as set forth in Claim 3, wherein said gas diffusion layer is formed in a nonwoven cloth or paper structure constituted substantially of said modified cross-sectioned carbon fiber alone or of a mixture in a predetermined proportion of said modified cross-sectioned carbon fiber and a circular cross-sectioned carbon fiber.

20. The fuel cell as set forth in Claim 1, wherein said gas diffusion layer is processed with a fluororesin to attain water-repellency.

21. The fuel cell as set forth in Claim 1, wherein carbon particles are applied to a surface or filled in an interior portion of said

gas diffusion layer.

22. The fuel cell as set forth in Claim 4, wherein carbon particles are applied to a surface or filled in an interior portion of said gas diffusion layer.

23. The fuel cell as set forth in Claim 7, wherein carbon particles are applied to a surface or filled in an interior portion of said gas diffusion layer.

24. The fuel cell as set forth in Claim 11, wherein carbon particles are applied to a surface or filled in an interior portion of said gas diffusion layer.

25. The fuel cell as set forth in Claim 1, wherein said fuel cell generates electricity in a temperature over 100 degree centigrade.

26. The fuel cell as set forth in Claim 1, wherein said fuel cell can operate under low-wet condition.

27. A material of a gas diffusion layer of a fuel cell including a modified cross-sectioned carbon fiber.